

# Intracellular behaviour of the lactating mammary gland cells after aluminium injection. An ultrastructural study

**Ayadi Ahlem<sup>a,\*</sup>, Maghraoui Samira<sup>a</sup>, Maaroufi Houcine<sup>a</sup>, El Hili Ali<sup>b</sup> and Tekaya Leila<sup>a</sup>**

<sup>a</sup>Laboratoire de physiologie, Faculté de Médecine de Tunis, 15 rue Jebel Lakhdhar, 1007 Bab Saâdoun. Tunis, Tunisie.

<sup>b</sup>Laboratoire de microscopie électronique, Faculté des Sciences de Tunis, Campus universitaire 2092, El Manar II, Tunis Tunisie.

---

**Summary-** The intracellular localization of aluminium in the lactating mammary gland cells has been studied using conventional transmission electron microscopy. Deposits were observed in the lysosomes of glandular epithelial cells which correspond probably to an insoluble salt of aluminium phosphate.

---

## 1. Introduction

Aluminium is the most abundant metallic element and the third constituent of the earth's crust. Because of its physical and chemical properties, aluminium has a wide variety of uses 1) in medicines in the duodenal and gastric ulcers treatment and 2) in industry such as building, transportation, food packaging, cooking utensils, food additives, medicines, cosmetics, water purification,... but this element has been implicated also in the etiology of several neurodegenerative disorders including Alzheimer's disease.

The aim of this work is to study the intracellular localization of aluminium in the lactating mammary gland cells after its intraperitoneal injection to female rats using the conventional transmission electron microscopy.

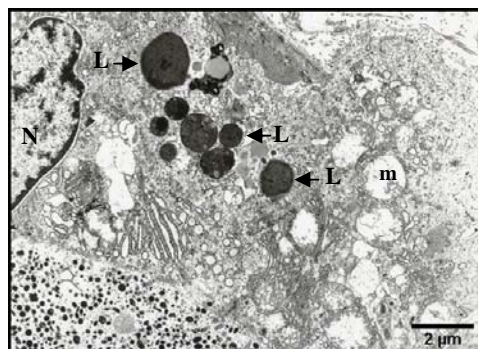
## 2. Results and discussion

The ultrastructural study of the lactating mammary gland cells has demonstrated the presence of very dense granules in the lysosomes of the glandular epithelial cells (figure 1). No inclusions were observed in the cell lysosomes of the control rats (figure 2).

Previous studies have attempted to research the intracellular localization of aluminium after its intraperitoneal injection. These results demonstrated that this element was precipitated in the cell lysosomes of the liver, the kidney, the brain, the muscle, the parathyroid and the bone marrow associated with phosphorus [1]. Another element of the same group, the gallium has been studied. This element has been found, associated with phosphorus, in the lysosomes of the epithelial glandular cells [2].

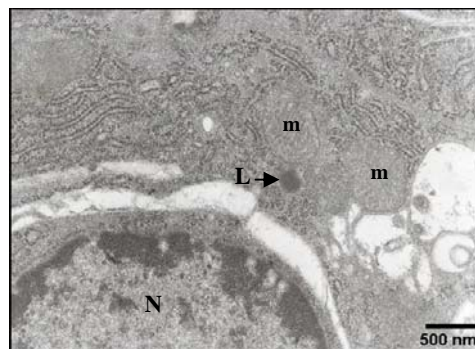
These data show that the deposits observed in the cell lysosomes may probably be composed of an insoluble salt of aluminium phosphate. The lysosome seems to be the main organit in witch are sequestered foreign and toxic elements.

**Figure 1-** Mammary glandular epithelial cell.



Altered mitochondria (m) and numerous charged lysosomes (L) are observed in the cytoplasm.

**Figure 2-** Control mammary glandular epithelial cell



No alterations were observed in lysosomes

## 3. Conclusion

More sensitive analysis, such as secondary ion mass spectrometry and electron microprobe, have to be carried out to precise the chemical nature of the intralysosomal deposits.

---

\*Ayadi Ahlem : ayadi.ahlem@yahoo.fr

## References

- [1] J.P. Berry. *The role of lysosomes in the selective concentration of mineral elements. A microanalytical study.* Cell. Mol. Biol. **42** (3) (1996) 395- 41
- [2] J.P. Berry, M.F. Poupon, S. Galle and F. Escaig *Role of lysosomes in gallium concentration by mammalian tissues.* Biol. Cell. **51** (1984) 43-52.